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DRINKING WATER SURVEILLANCE PROGRAM

FORT ERIE (ROSEHILL) WATER TREATMENT PLANT

ANNUAL REPORT 1990

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

FORT ERIE (ROSEHILL) WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Fort Erie (Rosehill) water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation, filtration, taste and odour control, and disinfection. This plant has a rated capacity of 50.0 x 1000 m^3/day. The Fort Erie (Rosehill) water treatment plant serves a population of approximately 25,000.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Fort Erie (Rosehill) water treatment plant, for the sample year 1990, produced good quality water and this quality was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP)

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

	SITE	RAW			TREATED			SITE 1			SITE 2	
SCAN	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	18	12	66	6	0	0	6	2	33	5	4	80
CHEMISTRY (FLD)	20	17	85	35	35	100	72	52	72	60	38	63
CHEMISTRY (LAB)	132	104	78	132	94	71	228	209	91	190	172	90
METALS	144	46	31	144	37	25	276	132	47	230	104	45
CHLOROAROMATICS	84	0	0	84	0	0	84	0	0	70	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.
PAH	102	0	0	85	0	0	.	.	.	.	.	.
PESTICIDES & PCB	205	0	0	205	0	0	128	0	0	107	0	0
PHENOLICS	6	1	16	6	1	16	.	.	.	.	.	.
SPECIFIC PESTICIDES	58	0	0	56	0	0	6	0	0	5	0	0
VOLATILES	174	0	0	174	24	13	145	20	13	145	20	13
TOTAL	955	180		939	191		945	415		812	338	

DRINKING WATER SURVEILLANCE PROGRAM

FORT ERIE (ROSEHILL) WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Fort Erie water treatment plant in the spring of 1987. Previous annual reports have been published for 1987, 1988 and 1989.

PLANT DESCRIPTION

The Fort Erie (Rosehill) water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation, filtration, taste and odour control, and disinfection. This plant has a rated capacity of 50.0 x 1000 m^3/day. The Fort Erie (Rosehill water treatment plant) serves a population of approximately 25,000.

The sample day flows ranged from 13.0 x 1000 m^3/day to 14.0 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count is a test used to supplement routine analysis for coliform bacteria. The limit for standard plate count (at 35°C after 48 hours) in the ODWOs is 500 counts/mL (based on a geometric mean of 5 or more samples). DWSP bacteriological analysis of treated and distributed water was limited to standard plate count, which may indicate some deterioration in water quality if the guideline of 500 counts/mL is exceeded.

Standard plate count (membrane filtration) exceeded the ODWO Maximum Desirable Concentration of 500 counts/mL in 3 of 11 distributed water samples with a maximum reported value of 2,400 counts/mL.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 4 of 17 treated and distributed water samples with a maximum reported value of 21.5°C.

CHEMISTRY (LAB)

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 HZU in 6 of 11 distributed water samples with a maximum reported value of 8.0 HZU.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 17 of 17 treated and distributed water samples with a maximum reported value of 138.0 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 9 of 17 treated and distributed water samples with a maximum reported value of 230.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 16 treated and distributed water samples analyzed with a maximum level of 43.1 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Fort Erie (Rosehill) water treatment plant, for the sample year 1990, produced good quality water and this quality was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

FORT ERIE (ROSE HILL) WTP

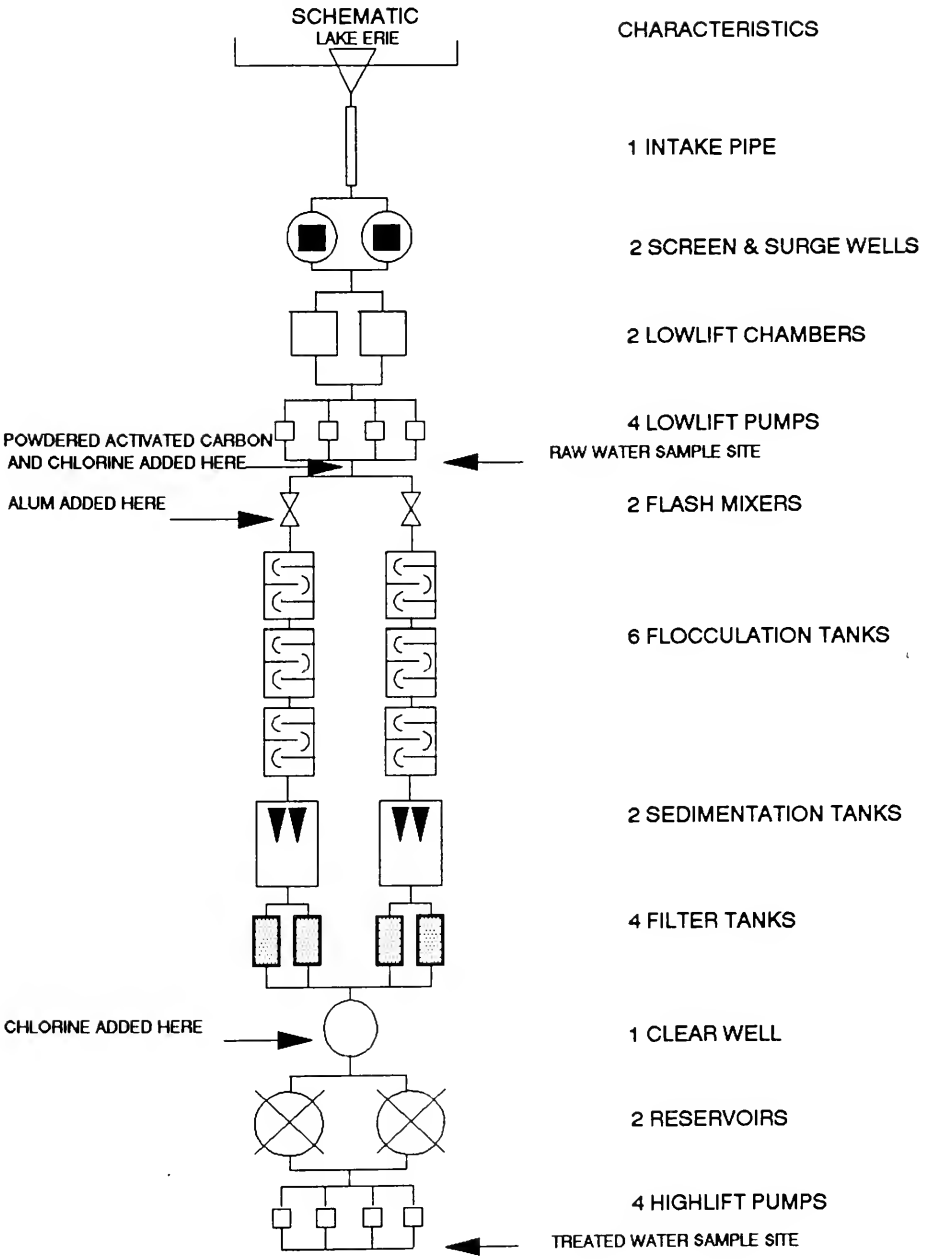

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220002020
PLANT NAME: FORT ERIE (ROSEHILL) WTP

DISTRICT: WELLAND
REGION: WEST CENTRAL
DISTRICT OFFICER :J. MAYES

UTM #: 176642804748700

PLANT SUPERINTENDENT: HAROLD HODGSON

ADDRESS: 300 ROSEHILL ROAD
FORT ERIE, ONT.

(416-871-3551)

MUNICIPALITY: NIAGARA
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	78.000	(X 1000 M3/DAY)
RATED CAPACITY:	50.000	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
FORT ERIE	25,000

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
FREE CHLORINE RESIDUAL	TREATED WATER IN LAB	EVERY 4 HOURS
	SETTLED WATER IN LAB	EVERY 4 HOURS
	FILTERED WATER IN LAB	EVERY 4 HOURS
	AFTER FILTERS	CONTINUOUS
	RAW WATER	CONTINUOUS
TEMPERATURE	RAW WATER	CONTINUOUS
TURBIDITY	SETTLED WATER IN LAB	EVERY 4 HOURS
	FILTERED WATER IN LAB	EVERY 4 HOURS
	AFTER FILTERS	CONTINUOUS
	RAW WATER IN LAB	EVERY 4 HOURS
	RAW WATER	CONTINUOUS

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)			
			PRE CHLORINATION	COAGULATION	POST CHLORINATION	TASTE & ODOUR
			CHLORINE	ALUM LIQUID	CHLORINE	ACTIVATED CARBON POWDER
ATE	DELAY * TIME(HRS)	FLOW (1000M3)				
EB 20	.00	13.000	.60	5.00	.30	
PR 24	14.24	14.000	1.10	6.00	.30	
JN 12	23.90	14.000	1.20	5.00	.35	
JG 21	23.90	14.000	1.85	5.00	.40	2.00
CT 23	10.00	14.000	1.30	4.00	.40	
EC 11	24.00	14.000	.95	5.00	.40	

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2	
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	6	4	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	6	0	0	6	2	0	5	4	0
TOTAL COLIFORM MF	6	2	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	6	6	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	18	12	0	6	0	0	6	2	0	5	4	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	1	0	0	6	6	0	12	4	0	10	0	0
FLD CHLORINE FREE	1	0	0	6	6	0	12	12	0	10	5	0
FLD CHLORINE (TOTAL)	1	0	0	6	6	0	12	12	0	10	5	0
FLD PH	5	5	0	5	5	0	12	12	0	10	10	0
FLD TEMPERATURE	6	6	0	6	6	0	12	12	0	10	10	0
FLD TURBIDITY	6	6	0	6	6	0	12	0	0	10	8	0
*TOTAL SCAN CHEMISTRY (FLD)	20	17	0	35	35	0	72	52	0	60	38	0
CHEMISTRY (LAB)												
ALKALINITY	6	6	0	6	6	0	12	12	0	10	10	0
CALCIUM	6	6	0	6	6	0	12	12	0	10	10	0
CYANIDE	6	0	1	6	0	1	.	.	.	.	.	.
CHLORIDE	6	6	0	6	6	0	12	12	0	10	10	0
COLOUR	6	1	5	6	0	5	12	10	2	10	10	0
CONDUCTIVITY	6	6	0	6	6	0	12	12	0	10	10	0
DISS ORG CARBON	6	6	0	6	6	0	12	12	0	10	10	0
FLUORIDE	6	6	0	6	6	0	12	12	0	10	10	0
HARDNESS	6	6	0	6	6	0	12	12	0	10	10	0
IONCAL	6	6	0	6	6	0	12	12	0	10	10	0
LANGELIERS INDEX	6	6	0	6	6	0	12	12	0	10	10	0
MAGNESIUM	6	6	0	6	6	0	12	12	0	10	10	0
SODIUM	6	6	0	6	6	0	12	12	0	10	10	0
AMMONIUM TOTAL	6	2	1	6	1	1	12	6	3	10	1	3
NITRITE	6	1	5	6	0	3	12	1	8	10	2	5
TOTAL NITRATES	6	6	0	6	6	0	12	12	0	10	10	0
NITROGEN TOT KJELD	6	6	0	6	6	0	12	12	0	10	9	1
PH	6	6	0	6	6	0	12	12	0	10	10	0
PHOSPHORUS FIL REACT	6	1	3	6	0	4	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	3	3	6	0	5	.	.	.	.	.	.
SULPHATE	6	6	0	6	6	0	12	12	0	10	10	0
TURBIDITY	6	6	0	6	3	3	12	12	0	10	10	0
*TOTAL SCAN CHEMISTRY (LAB)	132	104	18	132	94	22	228	209	13	190	172	9

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	6	0	0	6	0	0	12	0	3	10	0	0
ALUMINUM	6	6	0	6	6	0	12	12	0	10	10	0
ARSENIC	6	0	6	6	0	6	12	0	12	10	0	10
BARIUM	6	6	0	6	6	0	12	12	0	10	10	0
BORON	6	4	2	6	6	0	12	11	1	10	9	1
BERYLLIUM	6	0	2	6	0	1	12	0	1	10	0	2
CADMIUM	6	0	0	6	0	0	12	0	2	10	0	5
COBALT	6	0	5	6	0	6	12	0	11	10	0	8
CHROMIUM	6	0	4	6	0	3	12	0	8	10	0	8
COPPER	6	0	6	6	0	6	12	12	0	10	10	0
IRON	6	2	3	6	0	0	12	10	2	10	10	0
MERCURY	6	1	0	6	1	1	.	.	.	.	.	.
MANGANESE	6	6	0	6	3	3	12	12	0	10	10	0
MOLYBDENUM	6	6	0	6	6	0	12	12	0	10	10	0
NICKEL	6	0	6	6	0	6	12	5	6	10	0	8
LEAD	6	1	5	6	0	3	12	9	3	10	5	5
ANTIMONY	6	1	5	6	1	5	12	11	1	10	8	2
SELENIUM	6	0	2	6	0	3	12	0	6	10	0	3
STRONTIUM	6	6	0	6	6	0	12	12	0	10	10	0
TITANIUM	6	2	4	6	1	5	12	2	10	10	2	8
THALLIUM	6	0	0	6	0	0	12	0	0	10	0	0
URANIUM	6	0	6	6	0	6	12	0	12	10	0	10
VANADIUM	6	1	5	6	0	6	12	0	12	10	0	10
ZINC	6	4	2	6	1	5	12	12	0	10	10	0
*TOTAL SCAN METALS	144	46	63	144	37	65	276	132	90	230	104	80
*TOTAL GROUP INORGANIC & PHYSICAL	296	167	81	311	166	87	576	393	103	480	314	89
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	6	0	0	6	0	0	6	0	0	5	0	0
123 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
1234 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
1235 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
124 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
1245 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
135 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
HCB	6	0	0	6	0	0	6	0	0	5	0	0
HEXACHLOROETHANE	6	0	0	6	0	0	6	0	0	5	0	0
OCTACHLOROSTYRENE	6	0	0	6	0	0	6	0	0	5	0	0
PENTACHLOROBENZENE	6	0	0	6	0	0	6	0	0	5	0	0
236 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	5	0	0
245 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	5	0	0
26A TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	5	0	0
*TOTAL SCAN CHLOROAROMATICS	84	0	0	84	0	0	84	0	0	70	0	0
CHLOROPHENOLS												

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	6	0	0	5	0	0	.	.	.	.	.	.
ANTHRACENE	6	0	0	5	0	0	.	.	.	.	.	.
FLUORANTHENE	6	0	0	5	0	0	.	.	.	.	.	.
PYRENE	6	0	0	5	0	0	.	.	.	.	.	.
BENZO(A)ANTHRACENE	6	0	0	5	0	0	.	.	.	.	.	.
CHRYSENE	6	0	0	5	0	0	.	.	.	.	.	.
DIMETH. BENZ(A)ANTHR	6	0	0	5	0	0	.	.	.	.	.	.
BENZO(E) PYRENE	6	0	0	5	0	0	.	.	.	.	.	.
BENZO(B) FLUORANTHEN	6	0	0	5	0	0	.	.	.	.	.	.
PERYLENE	6	0	0	5	0	0	.	.	.	.	.	.
BENZO(K) FLUORANTHEN	6	0	0	5	0	0	.	.	.	.	.	.
BENZO(A) PYRENE	6	0	0	5	0	0	.	.	.	.	.	.
BENZO(G,H,I) PERYLEN	6	0	0	5	0	0	.	.	.	.	.	.
DIBENZO(A,H) ANTHRAC	6	0	0	5	0	0	.	.	.	.	.	.
INDENO(1,2,3-C,D) PY	6	0	0	5	0	0	.	.	.	.	.	.
BENZO(B) CHRYSENE	6	0	0	5	0	0	.	.	.	.	.	.
CORONENE	6	0	0	5	0	0	.	.	.	.	.	.
*TOTAL SCAN PAH	102	0	0	85	0	0	0	0	0	0	0	0
PESTICIDES & PCB												
ALDRIN	6	0	0	6	0	0	6	0	0	5	0	0
ALPHA BHC	6	0	3	6	0	3	6	0	4	5	0	2
BETA BHC	6	0	0	6	0	0	6	0	0	5	0	0
LINDANE	6	0	0	6	0	0	6	0	1	5	0	0
ALPHA CHLORDANE	6	0	0	6	0	0	6	0	0	5	0	0
GAMMA CHLORDANE	6	0	0	6	0	0	6	0	0	5	0	0
DIELDRIN	6	0	0	6	0	0	6	0	0	5	0	0
METHOXYCHLOR	6	0	0	6	0	0	6	0	0	5	0	0
ENDOSULFAN 1	6	0	0	6	0	0	6	0	0	5	0	0
ENDOSULFAN II	6	0	0	6	0	0	6	0	0	5	0	0
ENDRIN	6	0	0	6	0	0	6	0	0	5	0	0
ENDOSULFAN SULPHATE	6	0	0	6	0	0	6	0	0	5	0	0
HEPTACHLOR EPOXIDE	6	0	0	6	0	0	6	0	0	5	0	0
HEPTACHLOR	6	0	0	6	0	0	6	0	0	5	0	0
MIREX	6	0	0	6	0	0	6	0	0	5	0	0
OXYCHLORDANE	6	0	0	6	0	0	6	0	0	5	0	0
OPDDT	6	0	0	6	0	0	6	0	0	5	0	0
PCB	6	0	0	6	0	0	6	0	0	5	0	0
DDD	6	0	0	6	0	0	6	0	0	5	0	0
PPDDE	6	0	0	6	0	0	6	0	0	5	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	6	0	0	6	0	0	6	0	0	5	0	0
AMETRINE	6	0	0	6	0	0	.	.	.	.	.	.
ATRAZINE	6	0	2	6	0	3	.	.	.	.	.	.
ATRATONE	6	0	0	6	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	6	0	0	6	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	5	0	0	5	0	0	.	.	.	.	.	.
PROMETONE	6	0	0	6	0	0	.	.	.	.	.	.
PROPAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETRYNE	6	0	0	6	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	6	0	0	6	0	0	.	.	.	.	.	.
SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	6	0	0	6	0	0	.	.	.	.	.	.
METOLACHLOR	6	0	0	6	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	2	0	0	2	0	0	2	0	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB	205	0	5	205	0	6	128	0	5	107	0	2
PHENOLICS												
PHENOLICS	6	1	1	6	1	0	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	6	1	1	6	1	0	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	6	0	0	6	0	0	6	0	0	5	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	1	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	2	0	0	1	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	58	0	0	56	0	0	6	0	0	5	0	0
VOLATILES												
BENZENE	6	0	1	6	0	1	5	0	0	5	0	0
TOLUENE	6	0	0	6	0	0	5	0	0	5	0	0
ETHYLBENZENE	6	0	0	6	0	4	5	0	3	5	0	0
P-XYLENE	6	0	0	6	0	0	5	0	0	5	0	0
M-XYLENE	6	0	0	6	0	0	5	0	0	5	0	0
O-XYLENE	6	0	0	6	0	0	5	0	0	5	0	0
STYRENE	6	0	2	6	0	4	5	0	4	5	0	0
1,1 DICHLOROETHYLENE	6	0	0	6	0	0	5	0	0	5	0	0
METHYLENE CHLORIDE	6	0	0	6	0	0	5	0	0	5	0	0
T1,2DICHLOROETHYLENE	6	0	0	6	0	0	5	0	0	5	0	0
1,1 DICHLOROETHANE	6	0	0	6	0	0	5	0	0	5	0	0
CHLOROFORM	6	0	0	6	6	0	5	5	0	5	5	0
111, TRICHLOROETHANE	6	0	0	6	0	0	5	0	0	5	0	0
1,2 DICHLOROETHANE	6	0	0	6	0	0	5	0	0	5	0	0
CARBON TETRACHLORIDE	6	0	0	6	0	0	5	0	0	5	0	0
1,2 DICHLOROPROPANE	6	0	0	6	0	0	5	0	0	5	0	0
TRICHLOROETHYLENE	6	0	0	6	0	0	5	0	0	5	0	0
DICHLOROBROMOMETHANE	6	0	0	6	6	0	5	5	0	5	5	0
112 TRICHLOROETHANE	6	0	0	6	0	0	5	0	0	5	0	0
CHLORODIBROMOMETHANE	6	0	0	6	6	0	5	5	0	5	5	0
T-CHLOROETHYLENE	6	0	0	6	0	1	5	0	0	5	0	0
BROMOFORM	6	0	0	6	0	6	5	0	5	5	0	5
1122 T-CHLOROETHANE	6	0	0	6	0	0	5	0	0	5	0	0
CHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0
1,4 DICHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0
1,3 DICHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0
1,2 DICHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0
ETHLYENE DIBROMIDE	6	0	0	6	0	0	5	0	0	5	0	0
TOTL TRIHALOMETHANES	6	0	0	6	6	0	5	5	0	5	5	0
*TOTAL SCAN VOLATILES	174	0	3	174	24	16	145	20	12	145	20	5
*TOTAL GROUP ORGANIC	641	1	9	622	25	22	363	20	17	327	20	7

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIN		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(T06)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)		
FEB	BDL	.	.	.	.	.
APR	4	.	.	.	.	.
JUN	BDL	.	.	.	.	.
AUG	6	.	.	.	.	.
OCT	12	.	.	.	.	.
DEC	60	.	.	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)			DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)		
FEB	.	2 <=>	.	14	.	.
APR	.	1 <=>	.	3 <=>	.	220
JUN	.	3 <=>	.	4 <=>	.	2400 >
AUG	.	0 <=>	.	25	.	2400 >
OCT	.	2 <=>	.	8 <=>	.	2400 >
DEC	.	0 <=>	.	5 <=>	.	3 <=>
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)		
FEB	80 <=>	.	.	.	.	.
APR	1140	.	.	.	.	.
JUN	60 <=>	.	.	.	.	.
AUG	30 <=>	.	.	.	.	.
OCT	20 <=>	.	.	.	.	.
DEC	480	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	250	.	.	.	.	.
APR	8200	.	.	.	.	.
JUN	4600	.	.	.	.	.
AUG	24000 >	.	.	.	.	.
OCT	920	.	.	.	.	.
DEC	7300	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLO)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	.070	.000	.200	.	.
APR	.000	.170	.000	.000	.000	.000
JUN	.	.080	.200	.000	.000	.000
AUG	.	.200	.000	.000	.000	.000
OCT	.	.140	.200	.000	.000	.000
DEC	.	.140	.300	.000	.000	.000
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	.450	.300	.100	.	.
APR	.000	.350	.300	.300	.000	.100
JUN	.	.420	.100	.300	.000	.100
AUG	.	.300	.100	.300	.000	.100
OCT	.	.460	.100	.300	.000	.100
DEC	.	.410	.100	.100	.000	.100
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	.520	.300	.300	.	.
APR	.000	.520	.300	.300	.000	.100
JUN	.	.500	.300	.300	.000	.100
AUG	.	.500	.100	.300	.000	.100
OCT	.	.600	.300	.300	.000	.100
DEC	.	.550	.400	.100	.000	.100
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
FEB	7.800	7.500	7.600	7.600	.	.
APR	.	.	7.600	7.400	7.600	7.800
JUN	8.000	7.300	7.600	7.800	7.800	7.800
AUG	8.000	7.800	7.600	7.600	7.600	7.800
OCT	7.800	7.800	7.600	7.600	7.800	8.000
DEC	8.200	8.000	7.800	7.800	7.600	7.600
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)		
FEB	4.000	5.000	13.000	6.000	.	.
APR	8.000	9.000	13.000	7.000	9.000	8.500
JUN	13.000	14.000	17.000	14.000	16.000	15.000
AUG	21.500	21.500	21.000	19.500	21.000	21.000
OCT	15.000	15.000	18.000	16.000	16.000	15.000
DEC	6.000	6.000	16.000	11.000	8.000	8.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)		
FEB	1.500	.150	.000	.000	.	.
APR	4.200	.110	.000	.000	.200	.190
JUN	1.500	.190	.000	.000	.000	.000
AUG	.500	.120	.000	.000	.230	.230
OCT	2.400	.120	.000	.000	.300	.200
DEC	16.000	.080	.000	.000	.100	.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)		
FEB	102.100	96.500	98.000	98.700	.	.
APR	103.100	98.900	102.000	100.800	101.300	101.100
JUN	98.900	94.900	96.800	97.200	97.100	97.700
AUG	96.500	90.900	93.800	94.200	93.900	93.500
OCT	97.500	92.900	95.300	94.700	95.500	94.800
DEC	101.600	98.800	102.400	100.900	101.500	102.500
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)		
FEB	36.300	35.400	35.700	36.000	.	.
APR	39.400	39.000	40.600	39.800	39.800	40.200
JUN	38.400	37.800	39.600	39.200	39.000	39.000
AUG	36.000	37.200	38.000	37.800	37.400	37.000
OCT	36.100	36.400	37.100	38.100	37.500	36.800
DEC	35.800	36.600	38.400	37.600	37.400	37.200
CYANIDE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = .2 (A1)		
FEB	.002 <T	.002 <T	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)		
FEB	14.900	15.700	16.300	15.800	.	.
APR	15.000	15.900	16.300	16.000	16.400	16.600
JUN	15.700	17.000	17.300	17.200	17.100	17.100
AUG	14.500	17.000	17.400	17.300	17.300	17.200
OCT	14.800	16.300	16.700	16.500	16.500	16.600
DEC	16.000	16.700	17.100	17.000	17.000	16.800
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
FEB	2.000 <T	1.000 <T	5.000	7.000	.	.
APR	3.500	1.000 <T	4.500	3.500	6.500	7.000
JUN	2.000 <T	.500 <T	2.500	3.500	8.000	8.000
AUG	2.000 <T	.500 <T	3.000	1.500 <T	6.000	6.000
OCT	1.500 <T	BDL	1.500 <T	3.500	7.500	7.500
DEC	1.000 <T	.500 <T	6.000	3.500	5.500	6.000
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
FEB	293	292	303	296	.	.
APR	302	305	320	309	313	312
JUN	295	298	307	302	303	301
AUG	284	289	299	294	292	290
OCT	290	292	299	295	295	294
DEC	297	303	313	308	310	309

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
FEB	1.700	1.600	1.900	1.400	.	.
APR	2.100	1.800	1.800	1.700	1.600	1.700
JUN	2.000	1.800	1.800	1.700	1.600	1.700
AUG	2.100	1.800	1.700	1.600	1.400	1.500
OCT	1.800	1.700	1.700	1.600	1.400	1.400
DEC	1.900	1.700	1.800	1.700	1.600	1.500
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
FEB	.100	.100	.100	.100	.	.
APR	.120	.120	.120	.100	.100	.100
JUN	.120	.120	.100	.120	.120	.120
AUG	.120	.120	.120	.120	.120	.120
OCT	.120	.120	.120	.120	.120	.120
DEC	.120	.120	.100	.100	.120	.120
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
FEB	125.900	123.400	123.800	124.400	.	.
APR	136.000	134.000	138.000	136.000	136.000	138.000
JUN	134.000	133.000	136.000	135.000	135.000	135.000
AUG	125.000	128.000	129.000	127.000	127.000	126.000
OCT	127.500	130.200	130.300	132.200	131.200	129.500
DEC	124.000	125.000	130.000	127.000	128.000	127.000
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
FEB	2.075	2.709	4.094	3.817	.	.
APR	2.187	.418	.699	.988	.174	1.295
JUN	3.197	1.779	1.652	1.145	1.617	1.032
AUG	.141	.989	.196	1.165	.695	1.401
OCT	.375	2.044	.407	1.066	.275	.294
DEC	4.854	4.234	4.200	4.982	4.759	5.335
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
FEB	.403	.168	.224	.273	.	.
APR	.449	.385	.354	.381	.373	.386
JUN	.402	.206	.272	.271	.278	.312
AUG	.458	.324	.363	.375	.360	.404
OCT	.321	.243	.230	.260	.247	.256
DEC	.403	.328	.412	.387	.367	.379
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1	GUIDELINE = 30 (F2)		
FEB	8.550	8.500	8.400	8.300	.	.
APR	9.200	9.000	9.000	9.000	9.000	9.100
JUN	9.200	9.300	9.000	8.900	9.100	9.100
AUG	8.500	8.400	8.300	8.000	8.200	8.100
OCT	9.050	9.500	9.150	9.000	9.100	9.150
DEC	8.500	8.300	8.300	8.200	8.300	8.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
FEB	7.900	7.800	7.900	7.800	.	.
APR	9.000	8.800	9.600	9.400	9.400	9.800
JUN	8.800	8.600	8.600	8.600	8.600	8.600
AUG	8.400	8.400	8.600	8.600	8.800	8.600
OCT	7.500	7.600	7.600	7.800	7.800	8.000
DEC	9.000	9.200	9.400	9.200	9.600	9.600
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
FEB	BDL	BDL	.494	BDL	.	.
APR	BDL	BDL	.566	BDL	BDL	BDL
JUN	.002 <T	BDL	.258	BDL	.026	BDL
AUG	.014	BDL	.416	.002 <T	BDL	BDL
OCT	.010	.010	.078	.004 <T	.004 <T	.002 <T
DEC	BDL	.008 <T	.124	.004 <T	BDL	.002 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
FEB	.005	.002 <T	.003 <T	.002 <T	.	.
APR	.002 <T	BDL	BDL	BDL	BDL	BDL
JUN	.004 <T	BDL	.001 <T	.001 <T	.001 <T	.001 <T
AUG	.004 <T	.003 <T	.004 <T	.006	.008	.005
OCT	.003 <T	.001 <T	.001 <T	.001 <T	.001 <T	.001 <T
DEC	.004 <T	BDL	.001 <T	BDL	BDL	.001 <T
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
FEB	.280	.260	.900	.270	.	.
APR	.335	.335	1.070	.340	.385	.360
JUN	.330	.335	.685	.310	.365	.310
AUG	.155	.155	.755	.180	.205	.180
OCT	.200	.195	.335	.200	.215	.200
DEC	.300	.310	.570	.340	.365	.350
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
FEB	.220	.170	.800	.170	.	.
APR	.200	.130	.840	.120	.140	.110
JUN	.650	1.250	.480	.130	.190	.120
AUG	.200	.160	.610	.140	.120	.110
OCT	.210	.150	.300	.150	.160	.140
DEC	.290	.160	.250	.110	.160	.090 <T
PH (DIMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
FEB	8.270	8.070	8.120	8.160	.	.
APR	8.280	8.240	8.180	8.220	8.210	8.220
JUN	8.260	8.090	8.130	8.130	8.140	8.170
AUG	8.350	8.230	8.250	8.260	8.250	8.300
OCT	8.210	8.150	8.120	8.140	8.130	8.150
DEC	8.280	8.210	8.260	8.250	8.230	8.240

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A		
FEB	.001 <T	.000 <T	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
AUG	.000 <T	.000 <T	.	.	.	.
OCT	.001 <T	.002 <T	.	.	.	.
DEC	.008	.001 <T	.	.	.	.
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .40 (F2)		
FEB	.012	.006 <T	.	.	.	.
APR	.018	.004 <T	.	.	.	.
JUN	.008 <T	.003 <T	.	.	.	.
AUG	.005 <T	BDL	.	.	.	.
OCT	.007 <T	.002 <T	.	.	.	.
DEC	.035	.001 <T	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)		
FEB	20.920	23.550	23.280	23.420	.	.
APR	25.880	29.120	30.080	29.460	30.020	30.000
JUN	24.830	27.460	28.150	27.710	27.470	27.830
AUG	24.380	27.650	26.720	27.270	27.060	26.850
OCT	24.120	25.900	26.500	27.690	27.730	27.270
DEC	24.600	27.100	27.500	27.700	27.500	27.600
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)		
FEB	1.700	.240 <T	.920	.990	.	.
APR	4.400	.420	.990	.500	1.640	1.290
JUN	1.350	.150 <T	.500	.500	1.500	1.350
AUG	.840	.400	.680	.470	1.300	1.200
OCT	1.700	.230 <T	.370	.560	1.400	1.400
DEC	15.000	.210	1.640	.630	1.340	1.270

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)		
FEB	BDL	BDL	BDL	.060 <T	.	.
APR	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	.210 <T	BDL	BDL	BDL
AUG	BDL	BDL	.470 <T	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)		
FEB	21.000	80.000	66.000	54.000	.	.
APR	66.000	110.000	66.000	65.000	69.000	72.000
JUN	16.000	150.000	95.000	110.000	89.000	99.000
AUG	6.500	230.000	190.000	210.000	170.000	180.000
OCT	26.000	140.000	98.000	110.000	110.000	110.000
DEC	190.000	74.000	66.000	54.000	57.000	57.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)		
FEB	.770 <T	.320 <T	.390 <T	.400 <T	.	.
APR	.640 <T	.390 <T	.340 <T	.180 <T	.300 <T	.200 <T
JUN	.620 <T	.140 <T	.320 <T	.360 <T	.130 <T	.480 <T
AUG	.770 <T	.580 <T	.430 <T	.400 <T	.370 <T	.320 <T
OCT	.920 <T	.610 <T	.440 <T	.450 <T	.550 <T	.580 <T
DEC	.940 <T	.560 <T	.380 <T	.260 <T	.410 <T	.390 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
FEB	22.000	20.000	23.000	20.000	.	.
APR	21.000	20.000	21.000	20.000	21.000	21.000
JUN	20.000	20.000	21.000	20.000	20.000	21.000
AUG	20.000	19.000	20.000	20.000	20.000	19.000
OCT	22.000	21.000	21.000	20.000	20.000	20.000
DEC	23.000	20.000	21.000	20.000	19.000	19.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
FEB	39.000	21.000	21.000	22.000	.	.
APR	54.000	60.000	34.000	52.000	43.000	24.000
JUN	29.000	22.000	30.000	30.000	24.000	28.000
AUG	36.000	38.000	32.000	27.000	24.000	37.000
OCT	20.000 <T	21.000	20.000 <T	21.000	20.000 <T	21.000
DEC	20.000 <T	31.000	21.000	21.000	24.000	21.000
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)		
FEB	BDL	BDL	BDL	BDL	.	.
APR	.060 <T	.110 <T	BDL	.070 <T	.090 <T	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
AUG	.070 <T	BDL	BDL	BDL	BDL	.060 <T
OCT	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
FEB	BDL	BDL	.080 <T	BDL	.	.
APR	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	.100 <T	.100 <T
AUG	BDL	BDL	BDL	BDL	.110 <T	.130 <T
OCT	BDL	BDL	BDL	.080 <T	.070 <T	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
FEB	.130 <T	.080 <T	.110 <T	.080 <T	.	.
APR	.130 <T	.090 <T	.140 <T	.130 <T	.170 <T	.100 <T
JUN	BDL	.060 <T	.050 <T	BDL	BDL	.040 <T
AUG	.110 <T	.080 <T	.070 <T	.050 <T	BDL	.050 <T
OCT	.100 <T	.090 <T	.110 <T	.100 <T	.100 <T	.120 <T
DEC	.300 <T	.090 <T	.130 <T	.080 <T	.090 <T	.060 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
FEB	3.100 <T	BDL	BDL	BDL	.	.
APR	2.700 <T	3.000 <T	.900 <T	2.400 <T	1.900 <T	BDL
JUN	2.200 <T	BDL	2.000 <T	1.900 <T	.890 <T	1.600 <T
AUG	2.100 <T	2.200 <T	.800 <T	.950 <T	.530 <T	2.000 <T
OCT	BDL	BDL	.540 <T	1.300 <T	.540 <T	1.100 <T
DEC	BDL	2.500 <T	BDL	BDL	.810 <T	BDL
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
FEB	2.900 <T	1.000 <T	98.000	9.400	.	.
APR	1.300 <T	.970 <T	51.000	7.100	39.000	6.600
JUN	1.300 <T	1.000 <T	50.000	7.800	41.000	7.700
AUG	1.300 <T	1.100 <T	37.000	8.700	37.000	7.100
OCT	.970 <T	.850 <T	28.000	8.900	33.000	7.900
DEC	1.700 <T	1.100 <T	45.000	9.700	42.000	8.600
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)		
FEB	30.000 <T	BDL	130.000	200.000	.	.
APR	66.000	BDL	180.000	150.000	250.000	260.000
JUN	21.000 <T	BDL	96.000	130.000	270.000	260.000
AUG	BDL	BDL	120.000	53.000 <T	240.000	250.000
OCT	40.000 <T	BDL	56.000 <T	130.000	260.000	280.000
DEC	300.000	BDL	240.000	120.000	210.000	230.000
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)		
FEB	.110	.120	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	BDL	.070 <T	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)		
FEB	2.500	.730	8.000	13.000	.	.
APR	4.500	.810	12.000	13.000	6.700	6.800
JUN	6.200	.820	7.300	8.300	4.800	4.700
AUG	3.800	.480 <T	8.300	8.500	3.800	4.300
OCT	3.800	.300 <T	4.000	8.700	3.500	3.800
DEC	19.000	.370 <T	4.700	7.200	3.300	4.500
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
FEB	1.200	1.300	1.100	1.100	.	.
APR	1.100	1.300	1.100	1.100	1.100	1.100
JUN	1.100	1.300	1.100	1.100	1.100	.990
AUG	1.200	1.100	1.100	1.200	1.100	1.100
OCT	1.200	1.300	1.100	1.200	1.000	1.100
DEC	.720	1.100	1.200	1.200	1.200	1.100
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
FEB	.900 <T	1.000 <T	1.900 <T	.990 <T	.	.
APR	.870 <T	.800 <T	2.700	.380 <T	.850 <T	.790 <T
JUN	.440 <T	.460 <T	6.200	.840 <T	.710 <T	.370 <T
AUG	.730 <T	.900 <T	12.000	.680 <T	.760 <T	.530 <T
OCT	1.200 <T	1.000 <T	8.800	1.000 <T	.880 <T	.770 <T
DEC	.470 <T	.320 <T	4.100	BDL	BDL	BDL
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
FEB	.200 <T	BDL	11.000	.800	.	.
APR	.130 <T	BDL	3.100	.300 <T	1.000	.210 <T
JUN	.110 <T	.070 <T	2.600	.460 <T	.950	.340 <T
AUG	.100 <T	.090 <T	2.800	.700	1.300	.480 <T
OCT	.160 <T	BDL	1.600	.690	1.200	.400 <T
DEC	.570	.080 <T	2.900	.430 <T	.790	.190 <T
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
FEB	.490 <T	.500 <T	.670	.630	.	.
APR	.470 <T	.440 <T	.590	.590	.620	.570
JUN	.470 <T	.500 <T	.710	.640	.620	.630
AUG	.430 <T	.490 <T	.630	.490 <T	.440 <T	.430 <T
OCT	.560	.530	.570	.660	.530	.710
DEC	.490 <T	.480 <T	.610	.590	.540	.530
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)		
FEB	BDL	BDL	BDL	BDL	.	.
APR	1.100 <T	BDL	1.400 <T	1.400 <T	BDL	BDL
JUN	1.800 <T	1.400 <T	2.300 <T	2.500 <T	2.200 <T	1.600 <T
AUG	BDL	1.300 <T	BDL	1.600 <T	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	1.400 <T	1.200 <T	BDL	BDL	1.500 <T

TABLE 5
ORINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A		
FEB	170.000	170.000	170.000	170.000	.	.
APR	190.000	190.000	190.000	190.000	190.000	190.000
JUN	180.000	180.000	190.000	190.000	190.000	190.000
AUG	160.000	160.000	170.000	170.000	170.000	160.000
OCT	170.000	160.000	160.000	160.000	170.000	170.000
DEC	170.000	170.000	180.000	170.000	170.000	180.000
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
FEB	4.300 <T	3.500 <T	3.800 <T	3.600 <T	.	.
APR	10.000	9.600	8.900	10.000	9.900	9.900
JUN	4.500 <T	4.500 <T	4.600 <T	4.600 <T	5.000 <T	4.800 <T
AUG	3.300 <T	2.900 <T	3.400 <T	2.900 <T	3.400 <T	3.500 <T
OCT	2.600 <T	1.800 <T	1.800 <T	1.800 <T	2.000 <T	2.100 <T
DEC	5.200	1.900 <T	1.900 <T	1.600 <T	2.100 <T	2.100 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
FEB	.360 <T	.340 <T	.340 <T	.310 <T	.	.
APR	.380 <T	.330 <T	.310 <T	.320 <T	.320 <T	.310 <T
JUN	.340 <T	.300 <T	.280 <T	.300 <T	.280 <T	.290 <T
AUG	.290 <T	.260 <T	.300 <T	.270 <T	.280 <T	.280 <T
OCT	.350 <T	.370 <T	.300 <T	.380 <T	.320 <T	.320 <T
DEC	.380 <T	.330 <T	.290 <T	.340 <T	.310 <T	.310 <T
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
FEB	.170 <T	.290 <T	.160 <T	.210 <T	.	.
APR	.280 <T	.360 <T	.210 <T	.200 <T	.260 <T	.260 <T
JUN	.190 <T	.340 <T	.130 <T	.200 <T	.260 <T	.220 <T
AUG	.170 <T	.480 <T	.310 <T	.250 <T	.350 <T	.330 <T
OCT	.270 <T	.410 <T	.150 <T	.210 <T	.330 <T	.310 <T
DEC	.530	.300 <T	.170 <T	.140 <T	.160 <T	.180 <T
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
FEB	2.100	1.800 <T	28.000	3.900	.	.
APR	2.400	1.500 <T	18.000	2.800	52.000	8.800
JUN	3.000	1.400 <T	20.000	3.400	49.000	7.900
AUG	1.900 <T	2.200	22.000	4.000	37.000	6.200
OCT	2.000 <T	2.000 <T	19.000	5.100	39.000	9.300
DEC	4.800	1.700 <T	17.000	3.500	43.000	8.600

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DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)		
FEB	BDL	BDL	.	BDL	.	.
APR	1.000 <T	1.000 <T	.	1.000 <T	.	1.000 <T
JUN	1.000 <T	1.000 <T	.	3.000 <T	.	1.000 <T
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	1.000 <T	.	BDL
DEC	1.000 <T	1.000 <T	.	1.000 <T	.	BDL
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)		
FEB	BDL	BDL	.	BDL	.	.
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	1.000 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)		
FEB	BDL	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	BDL	80.000 <T	.	.	.	.
AUG	120.000 <T	80.000 <T	.	.	.	.
OCT	BDL	BDL	.	.	.	.
DEC	130.000 <T	110.000 <T	.	.	.	.

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DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = .2	GUIDELINE = 2 (A4)		
FEB	1.000	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
DEC	.800 <T	1.200	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
FEB	BDL	BDL	.	!U	.	.
APR	BDL	.050 <T	.	BDL	.	BDL
JUN	.050 <T	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
FEB	BDL	BDL	.	!U	.	.
APR	BDL	.150 <T	.	.050 <T	.	BDL
JUN	BDL	.100 <T	.	.150 <T	.	BDL
AUG	BDL	.150 <T	.	.050 <T	.	BDL
OCT	BDL	.100 <T	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
FEB	BDL	BDL	.	!U	.	.
APR	BDL	.200 <T	.	.100 <T	.	BDL
JUN	BDL	.100 <T	.	.300 <T	.	BDL
AUG	.100 <T	.200 <T	.	.150 <T	.	BDL
OCT	BDL	.150 <T	.	.050 <T	.	BDL
DEC	.050 <T	BDL	.	BDL	.	BDL
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
FEB	BDL	13.900	.	!U	.	.
APR	BDL	19.500	.	14.600	.	15.300
JUN	BDL	21.200	.	17.900	.	17.400
AUG	BDL	24.500	.	21.000	.	21.000
OCT	BDL	17.000	.	13.900	.	13.400
DEC	BDL	14.300	.	11.100	.	11.800
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)		
FEB	BDL	9.050	.	!U	.	.
APR	BDL	10.350	.	8.500	.	8.300
JUN	BDL	11.650	.	10.550	.	9.400
AUG	BDL	13.000	.	11.400	.	10.250
OCT	BDL	9.950	.	10.500	.	7.450
DEC	BDL	9.600	.	7.850	.	6.950
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
FEB	BDL	4.000	.	!U	.	.
APR	BDL	3.700	.	3.100	.	2.800
JUN	BDL	4.600	.	4.000	.	3.500
AUG	BDL	5.200	.	4.700	.	3.900
OCT	BDL	4.200	.	4.700	.	3.000
DEC	BDL	3.800	.	3.100	.	2.500

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT ERIE (ROSEHILL WTP) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)		
FEB	BDL	BDL	.	IU	.	.
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
AUG	BDL	.050 <T	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
BROMOFORM (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)		
FEB	BDL	.400 <T	.	IU	.	.
APR	BDL	.200 <T	.	.200 <T	.	.200 <T
JUN	BDL	.400 <T	.	.400 <T	.	.400 <T
AUG	BDL	.400 <T	.	.400 <T	.	.400 <T
OCT	BDL	.400 <T	.	.400 <T	.	.200 <T
DEC	BDL	.400 <T	.	.400 <T	.	.200 <T
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)		
FEB	BDL	27.300	.	IU	.	.
APR	BDL	33.800	.	26.450	.	26.650
JUN	BDL	37.850	.	32.850	.	30.600
AUG	BDL	43.100	.	37.500	.	35.500
OCT	BDL	31.550	.	29.350	.	24.150
DEC	BDL	28.100	.	22.300	.	21.450

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedance,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the MOE Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

PROGRAM INPUT - PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, the questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS
Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS
Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant.

4. DESIGN FLOW AND RETENTION TIME
The hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION
This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM
Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area;

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date

sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

PROGRAM INPUT - FIELD DATA
The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

PROGRAM INPUT - LABORATORY ANALYTICAL DATA
The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

PROGRAM INPUT - PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

PROGRAM OUTPUT - QUERY

All DWSP information is easily accessed through the Query function. Therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

PROGRAM OUTPUT - ACTION ALERTS

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives (ISBN 0-7729-2725-1 revised 1983). This publication contains health-related Maximum Acceptable Concentrations for thirty substances. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are consulted. The Parameter Listing System (PALIS) recently published (ISBN 0-7729-4461-X) by the MOE catalogues and keeps current over 1750 guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

PROGRAM OUTPUT - REPORT GENERATION

Custom reports can be generated from DWSP to meet the needs of the regions and to respond to public requests.

PROGRAM OUTPUT - ANNUAL REPORTS

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: P0C0D0 UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41).
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.
USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND

RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at PLANT

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample three times -fill to 2 cm from top
Bacti	-220 mL plastic bottle with white seal on cap -do not rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle; preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse; carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time in submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample three times -fill to 2 cm from top
Bacti	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle; preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.